Review of *"Global patterns and drivers of climate-driven fires in a warming world"*

This paper presents a timely and important study on how future climate change may affect global wildfire patterns and carbon emissions. Using CLM5 with interactive biogeochemistry and fire components, the authors simulate burned area and emissions under two future scenarios (SSP1-2.6 and SSP3-7.0). The inclusion of global and seasonal analyses helps capture broad patterns in future fire dynamics.

However, several aspects require further clarification or development. In particular, regional model evaluation is limited, interpretation relies heavily on correlations, and the machine learning analysis lacks methodological details. While the paper is well-structured and relevant to *Biogeosciences*, substantial revisions are needed before publication.

Major Comments

1. **Model Evaluation**
The model evaluation is only performed at the global scale, overlooking regional and seasonal differences in fire regimes. Many regions, such as boreal forests or the tropics, exhibit distinct fire behaviors that should be validated individually. Including regional comparisons with GFED data and assessing fire seasonality would increase confidence in the model's ability to project future trends.

2. **Correlation Metrics**
The paper draws many conclusions based on correlations between BA, meteorological variables, and vegetation carbon. While statistically strong, some statements read as causal—e.g. suggesting that increased vegetation directly "fuels more intense fires" (Lines 372–373), or that precipitation enhances BA in boreal forests (Line 331). These interpretations rely solely on correlations from model outputs without supporting observational references. A more cautious framing, supported by literature or alternative statistical methods, would strengthen this section.

3. **Machine Learning**
The use of XGBoost, LightGBM, and Random Forest for feature importance appears redundant, as all are tree-based methods with similar structures. The methodology lacks details on how feature importance was computed (e.g. permutation, SHAP), and no evaluation of model performance is provided. Without validation metrics, it is unclear whether the models are accurate enough to support reliable interpretation of variable importance. This section should be either better justified or revised with appropriate technical detail.

4. **Model Uncertainty**
Although standard deviations are reported in some figures, they only reflect interannual variability, not actual modeling uncertainty. The paper does not quantify uncertainties related to model structure, parameter choices, or scenario assumptions. A discussion of these limitations, or references to uncertainty estimates from comparable studies, would improve the robustness of the conclusions.

Minor Comments

- The spatial resolution of CLM5 (~100 km) may miss small-scale fires. A brief discussion on its implications would be useful.
- Although land use and population are held constant, it would help to briefly discuss how their future changes might affect BA and emissions.
- Using only 10-cm soil moisture may overlook deeper rooting in forests. A note on subsoil moisture would improve the interpretation.
- The strong correlation between BA and total carbon emissions (Lines 346–347) reflects a direct model dependency. This could be reframed more cautiously.
- While climate forcings are based on SSP1 and SSP3 scenarios, land use and population are held constant. Clarifying this partial inconsistency in the CLM5 setup would help readers understand the scope.